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TECH CENTER 1600/2900

SEQUENCE LISTING

> Zhu, Hai-Ying
Ling, Kai-Shu
Gonsalves, Dennis

<120> Grapevine Leafroll Virus Type 2 Proteins
and Their Uses

<130> 07678/062004

<140> US 09/613,486

<141> 2000-07-11

<150> US 09/080,983

<151> 1998-05-19

<150> US 60/047,194

<151> 1997-05-20

<160> 48

<170> FastSEQ for Windows Version 4.0

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<211> 15500

<212> DNA

<213> Grapevine Leafroll Virus (type 2)

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Gly Leu Leu Arg Phe Arg Val Gly Gly Asp Met Arg Phe Ser Arg Phe
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Phe Ser Ser Asn Tyr Gly Cys Arg Phe Val Ala Ser Val Arg Thr Asn
130         135         140
Thr Thr Val Trp Leu Asn Cys Thr Lys Ala Ser Gly Glu Lys Phe Ser
145         150         155         160
Leu Ala Ala Ala Cys Thr Ala Asp Tyr Val Ala Met Leu Arg Tyr Val
165         170         175
Cys Gly Gly Lys Phe Pro Leu Val Leu Met Ser Arg Val Ile Tyr Pro
180         185         190
Asp Gly Arg Cys Tyr Leu Ala His Met Arg Tyr Leu Cys Ala Phe Tyr
195         200         205
Cys Arg Pro Phe Arg Glu Ser Asp Tyr Ala Leu Gly Met Trp Pro Thr
210         215         220
Val Ala Arg Leu Arg Ala Cys Val Glu Lys Asn Phe Gly Val Glu Ala
225         230         235         240
Cys Gly Ile Ala Leu Arg Gly Tyr Tyr Thr Ser Arg Asn Val Tyr His

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				245					250								255
Cys	Asp	Tyr	Asp	Ser	Ala	Tyr	Val	Lys	Tyr	Phe	Arg	Asn	Leu	Ser	Gly		
			260					265					270				
Arg	Ile	Gly	Gly	Gly	Ser	Phe	Asp	Pro	Thr	Ser	Leu	Thr	Ser	Val	Ile		
		275					280					285					
Thr	Val	Lys	Ile	Ser	Gly	Leu	Pro	Gly	Gly	Leu	Pro	Lys	Asn	Ile	Ala		
		290				295					300						
Phe	Gly	Ala	Phe	Leu	Cys	Asp	Ile	Arg	Tyr	Val	Glu	Pro	Val	Asp	Ser		
305					310					315					320		
Gly	Gly	Ile	Gln	Ser	Ser	Val	Lys	Thr	Lys	Arg	Glu	Asp	Ala	His	Arg		
				325					330					335			
Thr	Val	Glu	Glu	Arg	Ala	Ala	Gly	Gly	Ser	Val	Glu	Gln	Pro	Arg	Gln		
			340					345					350				
Lys	Arg	Ile	Asp	Glu	Lys	Gly	Cys	Gly	Arg	Val	Pro	Ser	Gly	Gly	Phe		
		355					360					365					
Ser	His	Leu	Leu	Val	Gly	Asn	Leu	Asn	Glu	Val	Arg	Arg	Lys	Val	Ala		
		370				375					380						
Ala	Gly	Leu	Leu	Arg	Phe	Arg	Val	Gly	Gly	Asp	Met	Asp	Phe	His	Arg		
385					390					395					400		
Ser	Phe	Ser	Thr	Gln	Ala	Gly	His	Arg	Leu	Leu	Val	Trp	Arg	Arg	Ser		
				405					410					415			
Ser	Arg	Ser	Val	Cys	Leu	Glu	Leu	Tyr	Ser	Pro	Ser	Lys	Asn	Phe	Leu		
			420					425					430				
Arg	Tyr	Asp	Val	Leu	Pro	Cys	Ser	Gly	Asp	Tyr	Ala	Ala	Met	Phe	Ser		
		435					440					445					
Phe	Ala	Ala	Gly	Gly	Arg	Phe	Pro	Leu	Val	Leu	Met	Thr	Arg	Ile	Arg		
	450					455					460						
Tyr	Pro	Asn	Gly	Phe	Cys	Tyr	Leu	Ala	His	Cys	Arg	Tyr	Ala	Cys	Ala		
465					470					475					480		
Phe	Leu	Leu	Arg	Gly	Phe	Asp	Pro	Lys	Arg	Phe	Asp	Ile	Gly	Ala	Phe		
				485					490					495			
Pro	Thr	Ala	Ala	Lys	Leu	Arg	Asn	Arg	Met	Val	Ser	Glu	Leu	Gly	Glu		
			500					505					510				
Arg	Ser	Leu	Gly	Leu	Asn	Leu	Tyr	Gly	Ala	Tyr	Thr	Ser	Arg	Gly	Val		
		515					520					525					
Phe	His	Cys	Asp	Tyr	Asp	Ala	Lys	Phe	Ile	Lys	Asp	Leu	Arg	Leu	Met		
		530				535					540						
Ser	Ala	Val	Ile	Ala	Gly	Lys	Asp	Gly	Val	Glu	Glu	Val	Val	Pro	Ser		
545					550					555					560		
Asp	Ile	Thr	Pro	Ala	Met	Lys	Gln	Lys	Thr	Ile	Glu	Ala	Val	Tyr	Asp		
				565					570					575			

Gly Pro Arg Asn Ile Asp Ile Cys His Tyr Pro Leu Gly Ala Cys Asp
 725 730 735
 His Glu Ser Ser Ala Met Met Met Val Gln Val Tyr Asp Ala Ser Leu
 740 745 750
 Tyr Glu Ile Cys Gly Ala Met Ile Lys Lys Lys Ser Arg Ile Thr Tyr
 755 760 765
 Leu Thr Met Val Thr Pro Gly Glu Phe Leu Asp Gly Arg Glu Cys Val
 770 775 780
 Tyr Met Glu Ser Leu Asp Cys Glu Ile Glu Val Asp Val His Ala Asp
 785 790 795 800
 Val Val Met Tyr Lys Phe Gly Ser Ser Cys Tyr Ser His Lys Leu Ser
 805 810 815
 Ile Ile Lys Asp Ile Met Thr Thr Pro Tyr Leu Thr Leu Gly Gly Phe
 820 825 830
 Leu Phe Ser Val Glu Met Tyr Glu Val Arg Met Gly Val Asn Tyr Phe
 835 840 845
 Lys Ile Thr Lys Ser Glu Val Ser Pro Ser Ile Ser Cys Thr Lys Leu
 850 855 860
 Leu Arg Tyr Arg Arg Ala Asn Ser Asp Val Val Lys Val Lys Leu Pro
 865 870 875 880
 Arg Phe Asp Lys Lys Arg Arg Met Cys Leu Pro Gly Tyr Asp Thr Ile
 885 890 895
 Tyr Leu Asp Ser Lys Phe Val Ser Arg Val Phe Asp Tyr Val Val Cys
 900 905 910
 Asn Cys Ser Ala Val Asn Ser Lys Thr Phe Glu Trp Val Trp Ser Phe
 915 920 925
 Ile Lys Ser Ser Lys Ser Arg Val Ile Ile Ser Gly Lys Ile Ile His
 930 935 940
 Lys Asp Val Asn Leu Asp Leu Lys Tyr Val Glu Ser Phe Ala Ala Val
 945 950 955 960
 Met Leu Ala Ser Gly Val Arg Ser Arg Leu Ala Ser Glu Tyr Leu Ala
 965 970 975
 Lys Asn Leu Ser His Phe Ser Gly Asp Cys Ser Phe Ile Glu Ala Thr
 980 985 990
 Ser Phe Val Leu Arg Glu Lys Ile Arg Asn Met Thr Leu Asn Phe Asn
 995 1000 1005
 Glu Arg Leu Leu Gln Leu Val Lys Arg Val Ala Phe Ala Thr Leu Asp
 1010 1015 1020
 Val Ser Phe Leu Asp Leu Asp Ser Thr Leu Glu Ser Ile Thr Asp Phe
 1025 1030 1035 1040
 Ala Glu Cys Lys Val Ala Ile Glu Leu Asp Glu Leu Gly Cys Leu Arg
 1045 1050 1055
 Ala Glu Ala Glu Asn Glu Lys Ile Arg Asn Leu Ala Gly Asp Ser Ile
 1060 1065 1070
 Ala Ala Lys Leu Ala Ser Glu Ile Val Val Asp Ile Asp Ser Lys Pro
 1075 1080 1085
 Ser Pro Lys Gln Val Gly Asn Ser Ser Ser Glu Asn Ala Asp Lys Arg
 1090 1095 1100
 Glu Val Gln Arg Pro Gly Leu Arg Gly Gly Ser Arg Asn Gly Val Val
 1105 1110 1115 1120
 Gly Glu Phe Leu His Phe Val Val Asp Ser Ala Leu Arg Leu Phe Lys
 1125 1130 1135
 Tyr Ala Thr Asp Gln Gln Arg Ile Lys Ser Tyr Val Arg Phe Leu Asp
 1140 1145 1150
 Ser Ala Val Ser Phe Leu Asp Tyr Asn Tyr Asp Asn Leu Ser Phe Ile
 1155 1160 1165
 Leu Arg Val Leu Ser Glu Gly Tyr Ser Cys Met Phe Ala Phe Leu Ala
 1170 1175 1180
 Asn Arg Gly Asp Leu Ser Ser Arg Val Arg Ser Ala Val Cys Ala Val

1185 1190 1195 1200
 Lys Glu Val Ala Thr Ser Cys Ala Asn Ala Ser Val Ser Lys Ala Lys
 1205 1210 1215
 Val Met Ile Thr Phe Ala Ala Ala Val Cys Ala Met Met Phe Asn Ser
 1220 1225 1230
 Cys Gly Phe Ser Gly Asp Gly Arg Glu Tyr Lys Ser Tyr Ile His Arg
 1235 1240 1245
 Tyr Thr Gln Val Leu Phe Asp Thr Ile Phe Phe Glu Asp Ser Ser Tyr
 1250 1255 1260
 Leu Pro Ile Glu Val Leu Ser Ser Ala Ile Cys Gly Ala Ile Val Thr
 1265 1270 1275 1280
 Leu Phe Ser Ser Gly Ser Ser Ile Ser Leu Asn Ala Phe Leu Leu Gln
 1285 1290 1295
 Ile Thr Lys Gly Phe Ser Leu Glu Val Val Val Arg Asn Val Val Arg
 1300 1305 1310
 Val Thr His Gly Leu Ser Thr Thr Ala Thr Asp Gly Val Ile Arg Gly
 1315 1320 1325
 Val Phe Ser Gln Ile Val Ser His Leu Leu Val Gly Asn Thr Gly Asn
 1330 1335 1340
 Val Ala Tyr Gln Ser Ala Phe Ile Ala Gly Val Val Pro Leu Leu Val
 1345 1350 1355 1360
 Lys Lys Cys Val Ser Leu Ile Phe Ile Leu Arg Glu Asp Thr Tyr Ser
 1365 1370 1375
 Gly Phe Ile Lys His Gly Ile Ser Glu Phe Ser Phe Leu Ser Ser Ile
 1380 1385 1390
 Leu Lys Phe Leu Lys Gly Lys Leu Val Asp Glu Leu Lys Ser Ile Ile
 1395 1400 1405
 Gln Gly Val Phe Asp Ser Asn Lys His Val Phe Lys Glu Ala Thr Gln
 1410 1415 1420
 Glu Ala Ile Arg Thr Thr Val Met Gln Val Pro Val Ala Val Val Asp
 1425 1430 1435 1440
 Ala Leu Lys Ser Ala Ala Gly Lys Ile Tyr Asn Asn Phe Thr Ser Arg
 1445 1450 1455
 Arg Thr Phe Gly Lys Asp Glu Gly Ser Ser Ser Asp Gly Ala Cys Glu
 1460 1465 1470
 Glu Tyr Phe Ser Cys Asp Glu Gly Glu Gly Pro Gly Leu Lys Gly Gly
 1475 1480 1485
 Ser Ser Tyr Gly Phe Ser Ile Leu Ala Phe Phe Ser Arg Ile Met Trp
 1490 1495 1500
 Gly Ala Arg Arg Leu Ile Val Lys Val Lys His Glu Cys Phe Gly Lys
 1505 1510 1515 1520
 Leu Phe Glu Phe Leu Ser Leu Lys Leu His Glu Phe Arg Thr Arg Val
 1525 1530 1535
 Phe Gly Lys Asn Arg Thr Asp Val Gly Val Tyr Asp Phe Leu Pro Thr
 1540 1545 1550
 Gly Ile Val Glu Thr Leu Ser Ser Ile Glu Glu Cys Asp Gln Ile Glu
 1555 1560 1565
 Glu Leu Leu Gly Asp Asp Leu Lys Gly Asp Lys Asp Ala Ser Leu Thr
 1570 1575 1580
 Asp Met Asn Tyr Phe Glu Phe Ser Glu Asp Phe Leu Ala Ser Ile Glu
 1585 1590 1595 1600
 Glu Pro Pro Phe Ala Gly Leu Arg Gly Gly Ser Lys Asn Ile Ala Ile
 1605 1610 1615
 Leu Ala Ile Leu Glu Tyr Ala His Asn Leu Phe Arg Ile Val Ala Ser
 1620 1625 1630
 Lys Cys Ser Lys Arg Pro Leu Phe Leu Ala Phe Ala Glu Leu Ser Ser
 1635 1640 1645
 Ala Leu Ile Glu Lys Phe Lys Glu Val Phe Pro Arg Lys Ser Gln Leu
 1650 1655 1660

Val Ala Ile Val Arg Glu Tyr Thr Gln Arg Phe Leu Arg Ser Arg Met
1665 1670 1675 1680
Arg Ala Leu Gly Leu Asn Asn Glu Phe Val Val Lys Ser Phe Ala Asp
1685 1690 1695
Leu Leu Pro Ala Leu Met Lys Arg Lys Val Ser Gly Ser Phe Leu Ala
1700 1705 1710
Ser Val Tyr Arg Pro Leu Arg Gly Phe Ser Tyr Met Cys Val Ser Ala
1715 1720 1725
Glu Arg Arg Glu Lys Phe Phe Ala Leu Val Cys Leu Ile Gly Leu Ser
1730 1735 1740
Leu Pro Phe Phe Val Arg Ile Val Gly Ala Lys Ala Cys Glu Glu Leu
1745 1750 1755 1760
Val Ser Ser Ala Arg Arg Phe Tyr Glu Arg Ile Lys Ile Phe Leu Arg
1765 1770 1775
Gln Lys Tyr Val Ser Leu Ser Asn Phe Phe Cys His Leu Phe Ser Ser
1780 1785 1790
Asp Val Asp Asp Ser Ser Ala Ser Ala Gly Leu Lys Gly Gly Ala Ser
1795 1800 1805
Arg Met Thr Leu Phe His Leu Leu Val Arg Leu Ala Ser Ala Leu Leu
1810 1815 1820
Ser Leu Gly Trp Glu Gly Leu Lys Leu Leu Leu Ser His His Asn Leu
1825 1830 1835 1840
Leu Phe Leu Cys Phe Ala Leu Val Asp Asp Val Asn Val Leu Ile Lys
1845 1850 1855
Val Leu Gly Gly Leu Ser Phe Phe Val Gln Pro Ile Phe Ser Leu Phe
1860 1865 1870
Ala Ala Met Leu Leu Gln Pro Asp Arg Phe Val Glu Tyr Ser Glu Lys
1875 1880 1885
Leu Val Thr Ala Phe Glu Phe Phe Leu Lys Cys Ser Pro Arg Ala Pro
1890 1895 1900
Ala Leu Leu Lys Gly Phe Phe Glu Cys Val Ala Asn Ser Thr Val Ser
1905 1910 1915 1920
Lys Thr Val Arg Arg Leu Leu Arg Cys Phe Val Lys Met Leu Lys Leu
1925 1930 1935
Arg Lys Gly Arg Gly Leu Arg Ala Asp Gly Arg Gly Leu His Arg Gln
1940 1945 1950
Lys Ala Val Pro Val Ile Pro Ser Asn Arg Val Val Thr Asp Gly Val
1955 1960 1965
Glu Arg Leu Ser Val Lys Met Gln Gly Val Glu Ala Leu Arg Thr Glu
1970 1975 1980
Leu Arg Ile Leu Glu Asp Leu Asp Ser Ala Val Ile Glu Lys Leu Asn
1985 1990 1995 2000
Arg Arg Arg Asn Arg Asp Thr Asn Asp Asp Glu Phe Thr Arg Pro Ala
2005 2010 2015
His Glu Gln Met Gln Glu Val Thr Thr Phe Cys Ser Lys Ala Asn Ser
2020 2025 2030
Ala Gly Leu Ala Leu Glu Arg Ala Val Leu Val Glu Asp Ala Ile Lys
2035 2040 2045
Ser Glu Lys Leu Ser Lys Thr Val Asn Glu Met Val Arg Lys Gly Ser
2050 2055 2060
Thr Thr Ser Glu Glu Val Ala Val Ala Leu Ser Asp Asp Glu Ala Val
2065 2070 2075 2080
Glu Glu Ile Ser Val Ala Asp Glu Arg Asp Asp Ser Pro Lys Thr Val
2085 2090 2095
Arg Ile Ser Glu Tyr Leu Asn Arg Leu Asn Ser Ser Phe Glu Phe Pro
2100 2105 2110
Lys Pro Ile Val Val Asp Asp Asn Lys Asp Thr Gly Gly Leu Thr Asn
2115 2120 2125
Ala Val Arg Glu Phe Tyr Tyr Met Gln Glu Leu Ala Leu Phe Glu Ile

2130	2135	2140
His Ser Lys Leu Cys Thr Tyr Tyr Asp Gln Leu Arg Ile Val Asn Phe		
2145	2150	2155 2160
Asp Arg Ser Val Ala Pro Cys Ser Glu Asp Ala Gln Leu Tyr Val Arg		
2165	2170	2175
Lys Asn Gly Ser Thr Ile Val Gln Gly Lys Glu Val Arg Leu His Ile		
2180	2185	2190
Lys Asp Phe His Asp His Asp Phe Leu Phe Asp Gly Lys Ile Ser Ile		
2195	2200	2205
Asn Lys Arg Arg Arg Gly Gly Asn Val Leu Tyr His Asp Asn Leu Ala		
2210	2215	2220
Phe Leu Ala Ser Asn Leu Phe Leu Ala Gly Tyr Pro Phe Ser Arg Ser		
2225	2230	2235 2240
Phe Val Phe Thr Asn Ser Ser Val Asp Ile Leu Leu Tyr Glu Ala Pro		
2245	2250	2255
Pro Gly Gly Gly Lys Thr Thr Thr Leu Ile Asp Ser Phe Leu Lys Val		
2260	2265	2270
Phe Lys Lys Gly Glu Val Ser Thr Met Ile Leu Thr Ala Asn Lys Ser		
2275	2280	2285
Ser Gln Val Glu Ile Leu Lys Lys Val Glu Lys Glu Val Ser Asn Ile		
2290	2295	2300
Glu Cys Gln Lys Arg Lys Asp Lys Arg Ser Pro Lys Lys Ser Ile Tyr		
2305	2310	2315 2320
Thr Ile Asp Ala Tyr Leu Met His His Arg Gly Cys Asp Ala Asp Val		
2325	2330	2335
Leu Phe Ile Asp Glu Cys Phe Met Val His Ala Gly Ser Val Leu Ala		
2340	2345	2350
Cys Ile Glu Phe Thr Arg Cys His Lys Val Met Ile Phe Gly Asp Ser		
2355	2360	2365
Arg Gln Ile His Tyr Ile Glu Arg Asn Glu Leu Asp Lys Cys Leu Tyr		
2370	2375	2380
Gly Asp Leu Asp Arg Phe Val Asp Leu Gln Cys Arg Val Tyr Gly Asn		
2385	2390	2395 2400
Ile Ser Tyr Arg Cys Pro Trp Asp Val Cys Ala Trp Leu Ser Thr Val		
2405	2410	2415
Tyr Gly Asn Leu Ile Ala Thr Val Lys Gly Glu Ser Glu Gly Lys Ser		
2420	2425	2430
Ser Met Arg Ile Asn Glu Ile Asn Ser Val Asp Asp Leu Val Pro Asp		
2435	2440	2445
Val Gly Ser Thr Phe Leu Cys Met Leu Gln Ser Glu Lys Leu Glu Ile		
2450	2455	2460
Ser Lys His Phe Ile Arg Lys Gly Leu Thr Lys Leu Asn Val Leu Thr		
2465	2470	2475 2480
Val His Glu Ala Gln Gly Glu Thr Tyr Ala Arg Val Asn Leu Val Arg		
2485	2490	2495
Leu Lys Phe Gln Glu Asp Glu Pro Phe Lys Ser Ile Arg His Ile Thr		
2500	2505	2510
Val Ala Leu Ser Arg His Thr Asp Ser Leu Thr Tyr Asn Val Leu Ala		
2515	2520	2525
Ala Arg Arg Gly Asp Ala Thr Cys Asp Ala Ile Gln Lys Ala Ala Glu		
2530	2535	2540
Leu Val Asn Lys Phe Arg Val Phe Pro Thr Ser Phe Gly Gly Ser Val		
2545	2550	2555 2560
Ile Asn Leu Asn Val Lys Lys Asp Val Glu Asp Asn Ser Arg Cys Lys		
2565	2570	2575
Ala Ser Ser Ala Pro Leu Ser Val Ile Asn Asp Phe Leu Asn Glu Val		
2580	2585	2590
Asn Pro Gly Thr Ala Val Ile Asp Phe Gly Asp Leu Ser Ala Asp Phe		
2595	2600	2605

Ser Thr Gly Pro Phe Glu Cys Gly Ala Ser Gly Ile Val Val Arg Asp
 2610 2615 2620
 Asn Ile Ser Ser Ser Asn Ile Thr Asp His Asp Lys Gln Arg Val
 2625 2630 2635

<210> 4
 <211> 1380
 <212> DNA
 <213> Grapevine Leafroll Virus (type 2)

<400> 4
 agcgtagtgc ggtcgcaggc gattccgcgt agaaaacctt ctctacaaga aaatttgtat 60
 tcgtttgaag cgcggaatta taacttctcg acttgcgacc gtaacacatc tgcttcaatg 120
 ttccgagagg ctatggcgat gaactgtctt cgtcgttgct tcgacctaga tgccttttcg 180
 tccctgcgtg atgatgtgat tagtatcaca cgttcaggca tcgaacaatg gctggagaaa 240
 cgtactccta gtcagattaa agcattaatg aaggatgttg aatcgccttt ggaaattgac 300
 gatgaaattt gtcgttttaa gttgatggtg aagcgtgacg ctaaggtgaa gttagactct 360
 tcttgtttta ctaaaccacag cgccgctcaa aatatcatgt ttcacgcaa gagcattaat 420
 gctatcttct ctctatctct taatgaggtg aaaaaccgaa taatgtgctg tcttaagcct 480
 aacataaagt tttttacgga gatgactaac agggattttg cttctgttgt cagcaacatg 540
 cttggtgacg acgatgtgta ccatataggt gaagttgatt tctcaaagta cgacaagtct 600
 caagatgctt tcgtgaaggc ttttgaagaa gtaatgtata aggaactcgg tgttgatgaa 660
 gagttgctgg ctatctggat gtgcggcgag cggttatcga tagctaacac tctcgatggt 720
 cagttgtcct tcacgatcga gaatcaaagg aagtcgggag cttcgaacac ttggattggt 780
 aactctctcg tcactttggg tattttaagt ctttactacg acgttagaaa ttccgaggcg 840
 ttgtacatct cgggcgatga ttctttaatt ttttctcgca gcgagatttc gaattatgcc 900
 gacgacatat gcactgacat gggttttgag acaaaattta tgtccccaag tgtcccgtac 960
 ttttgttcta aatttgttgt tatgtgtggt cataagacgt ttttgttcc cgacccgtac 1020
 aagctttttg tcaagttggg agcagtcaaa gaggatgttt caatggattt ccttttcgag 1080
 acttttaacct cctttaaaga cttaacctcc gattttaacg acgagcgcct aattcaaaag 1140
 ctgcgtgaac ttgtggcttt aaaatatgag gttcaaaccg gcaacaccac cttggcggtta 1200
 agtgtgatac attgtttgcg ttccgaatttc ctctcgttta gcaagttata tccctcgcgtg 1260
 aagggatggc aggtttttta caogtcgggt aagaaagcgc ttctcaagag tgggtgttct 1320
 ctcttcgaca gtttcatgac cccttttgggt caggctgtca tggtttggga tgatgagtag 1380

<210> 5
 <211> 459
 <212> PRT
 <213> Grapevine Leafroll Virus (type 2)

<400> 5
 Ser Val Val Arg Ser Gln Ala Ile Pro Arg Arg Lys Pro Ser Leu Gln
 1 5 10 15
 Glu Asn Leu Tyr Ser Phe Glu Ala Arg Asn Tyr Asn Phe Ser Thr Cys
 20 25 30
 Asp Arg Asn Thr Ser Ala Ser Met Phe Gly Glu Ala Met Ala Met Asn
 35 40 45
 Cys Leu Arg Arg Cys Phe Asp Leu Asp Ala Phe Ser Ser Leu Arg Asp
 50 55 60
 Asp Val Ile Ser Ile Thr Arg Ser Gly Ile Glu Gln Trp Leu Glu Lys
 65 70 75 80
 Arg Thr Pro Ser Gln Ile Lys Ala Leu Met Lys Asp Val Glu Ser Pro
 85 90 95
 Leu Glu Ile Asp Asp Glu Ile Cys Arg Phe Lys Leu Met Val Lys Arg
 100 105 110
 Asp Ala Lys Val Lys Leu Asp Ser Ser Cys Leu Thr Lys His Ser Ala
 115 120 125

Ala	Gln	Asn	Ile	Met	Phe	His	Arg	Lys	Ser	Ile	Asn	Ala	Ile	Phe	Ser
130						135					140				
Pro	Ile	Phe	Asn	Glu	Val	Lys	Asn	Arg	Ile	Met	Cys	Cys	Leu	Lys	Pro
145						150				155					160
Asn	Ile	Lys	Phe	Phe	Thr	Glu	Met	Thr	Asn	Arg	Asp	Phe	Ala	Ser	Val
				165					170						175
Val	Ser	Asn	Met	Leu	Gly	Asp	Asp	Asp	Val	Tyr	His	Ile	Gly	Glu	Val
			180					185					190		
Asp	Phe	Ser	Lys	Tyr	Asp	Lys	Ser	Gln	Asp	Ala	Phe	Val	Lys	Ala	Phe
		195					200					205			
Glu	Glu	Val	Met	Tyr	Lys	Glu	Leu	Gly	Val	Asp	Glu	Glu	Leu	Leu	Ala
	210					215					220				
Ile	Trp	Met	Cys	Gly	Glu	Arg	Leu	Ser	Ile	Ala	Asn	Thr	Leu	Asp	Gly
225					230					235					240
Gln	Leu	Ser	Phe	Thr	Ile	Glu	Asn	Gln	Arg	Lys	Ser	Gly	Ala	Ser	Asn
				245					250					255	
Thr	Trp	Ile	Gly	Asn	Ser	Leu	Val	Thr	Leu	Gly	Ile	Leu	Ser	Leu	Tyr
		260						265					270		
Tyr	Asp	Val	Arg	Asn	Phe	Glu	Ala	Leu	Tyr	Ile	Ser	Gly	Asp	Asp	Ser
		275					280					285			
Leu	Ile	Phe	Ser	Arg	Ser	Glu	Ile	Ser	Asn	Tyr	Ala	Asp	Asp	Ile	Cys
	290					295					300				
Thr	Asp	Met	Gly	Phe	Glu	Thr	Lys	Phe	Met	Ser	Pro	Ser	Val	Pro	Tyr
305					310					315					320
Phe	Cys	Ser	Lys	Phe	Val	Val	Met	Cys	Gly	His	Lys	Thr	Phe	Phe	Val
				325					330					335	
Pro	Asp	Pro	Tyr	Lys	Leu	Phe	Val	Lys	Leu	Gly	Ala	Val	Lys	Glu	Asp
			340					345					350		
Val	Ser	Met	Asp	Phe	Leu	Phe	Glu	Thr	Phe	Thr	Ser	Phe	Lys	Asp	Leu
		355					360					365			
Thr	Ser	Asp	Phe	Asn	Asp	Glu	Arg	Leu	Ile	Gln	Lys	Leu	Ala	Glu	Leu
	370					375					380				
Val	Ala	Leu	Lys	Tyr	Glu	Val	Gln	Thr	Gly	Asn	Thr	Thr	Leu	Ala	Leu
385					390					395					400
Ser	Val	Ile	His	Cys	Leu	Arg	Ser	Asn	Phe	Leu	Ser	Phe	Ser	Lys	Leu
				405					410					415	
Tyr	Pro	Arg	Val	Lys	Gly	Trp	Gln	Val	Phe	Tyr	Thr	Ser	Val	Lys	Lys
			420					425					430		
Ala	Leu	Leu	Lys	Ser	Gly	Cys	Ser	Leu	Phe	Asp	Ser	Phe	Met	Thr	Pro
		435					440					445			
Phe	Gly	Gln	Ala	Val	Met	Val	Trp	Asp	Asp	Glu					
	450					455									

<210> 6
 <211> 171
 <212> DNA
 <213> Grapevine Leafroll Virus (type 2)

<400> 6
 atgaatcagg ttttgcagtt tgaatgtttg tttctgctga atctcgcggt ttttgctgtg 60
 actttcattt tcattcttct ggtcttccgc gtgattaagt cttttcgcca gaagggtcac 120
 gaagcacctg ttcccgttgt tcgtggcggg ggtttttcaa ccgtagtgta g 171

<210> 7
 <211> 56
 <212> PRT
 <213> Grapevine Leafroll Virus (type 2)

<400> 7

Met Asn Gln Val Leu Gln Phe Glu Cys Leu Phe Leu Leu Asn Leu Ala
1 5 10 15
Val Phe Ala Val Thr Phe Ile Phe Ile Leu Leu Val Phe Arg Val Ile
20 25 30
Lys Ser Phe Arg Gln Lys Gly His Glu Ala Pro Val Pro Val Val Arg
35 40 45
Gly Gly Gly Phe Ser Thr Val Val
50 55

<210> 8

<211> 1800

<212> DNA

<213> Grapevine Leafroll Virus (type 2)

<400> 8

atggtagttt tcggtttgga ctttggcacc acattctcta cgggtgtgtgt gtacaaggat 60
ggacgagttt ttctattcaa gcagaataat tcggcgtaca tccccactta cctctatctc 120
ttctccgatt ctaaccacat gacttttggg tacgaggccg aatcactgat gagtaatctg 180
aaagttaaag gttcgtttta tagagattta aaacgttggg tgggttgcga ttcgagtaac 240
ctcgacgcgt accttgaccg tttaaaacct cattactcgg tccgcttggg taagatcggc 300
tctggcttga acgaaactgt ttcaattgga aacttcgggg gcactgttaa gtctgaggct 360
catctgccag ggttgatagc tctctttatt aaggctgtca ttagttgcgc ggagggcgcg 420
tttgcgtgca cttgcaccgg ggttatttgg tcagtacctg ccaattatga tagcgttcaa 480
aggaatttca ctgatcagtg tgtttcactc agcggttatc agtgcgtata tatgatcaat 540
gaaccttcag cggctgcgct atctgcgtgt aattcgattg gaaagaagtc cgcaaatttg 600
gctgttttac atttcggtgg tgggaccttc gacgtgtcta tcatttcata ccgcaacaat 660
acttttgttg tgcgagcttc tggaggcgat ctaaactctg gtggaaggga tgttgatcgt 720
gcgtttctca cgcacctctt ctctttaaca tcgctggaac ctgacctcac tttggatata 780
tcgaatctga aagaatcttt atcaaaaacg gacgcagaga tagtttacac tttgagaggt 840
gtcgaatgaa gaaaagaaga cgttagagta aacaaaaaca ttcttacgtc ggtgatgctc 900
ccctacgtga acagaacgct taagatatta gagtcaacct taaaatcgta tgctaagagt 960
atgaatgaga gtgcgcgagt taagtgcgat ttagtgctga taggaggatc ttcatatctt 1020
cctggcctgg cagacgtact aacgaagcat cagagcgttg atcgtatctt aagagtttcg 1080
gatcctcggg ctgccgtggc cgtcgggttg gcattatatt ctcatgcct ctgaggatct 1140
gggggggttg tactgatcga ctgtgcagct cacactgtcg ctatagcgga cagaagtgtg 1200
catcaaataca tttgcgctcc agcgggggca ccgatccctt tttcaggaag catgccttg 1260
tacttagcca gggtaacaa gaactcgcag cgtgaagtgc ccgtgtttga aggggagtag 1320
gttaagtgcc ctaagaacag aaagatctgt ggagcaata taagattttt tgatatagga 1380
gtgacgggtg attcgtacgc acccgttacc ttctatatgg atttctccat ttcaagcgta 1440
ggagccgttt cattcgtggg gagaggctct gagggtaagc aagtgtcact cactggaact 1500
ccagcgtata acttttcgtc tgtggctctc ggatcacgca gtgtccgaga attgcatatt 1560
agtttaataa ataaagtttt tctcggtttg cttctacata gaaaggcgga tcgacgaata 1620
cttttacta aggatgaagc gattcgatac gccgattcaa ttgatatacg ggatgtgcta 1680
aaggaatata aaagttagc ggccagtgcc ttaccaccag acgaggatgt cgaattactc 1740
ctgggaaagt ctgttcaaaa agttttacgg ggaagcagac tggaagaaat acctctctag 1800

<210> 9

<211> 599

<212> PRT

<213> Grapevine Leafroll Virus (type 2)

<400> 9

Met Val Val Phe Gly Leu Asp Phe Gly Thr Thr Phe Ser Thr Val Cys
1 5 10 15
Val Tyr Lys Asp Gly Arg Val Phe Ser Phe Lys Gln Asn Asn Ser Ala
20 25 30

Tyr	Ile	Pro	Thr	Tyr	Leu	Tyr	Leu	Phe	Ser	Asp	Ser	Asn	His	Met	Thr
		35					40					45			
Phe	Gly	Tyr	Glu	Ala	Glu	Ser	Leu	Met	Ser	Asn	Leu	Lys	Val	Lys	Gly
	50					55					60				
Ser	Phe	Tyr	Arg	Asp	Leu	Lys	Arg	Trp	Val	Gly	Cys	Asp	Ser	Ser	Asn
	65				70					75					80
Leu	Asp	Ala	Tyr	Leu	Asp	Arg	Leu	Lys	Pro	His	Tyr	Ser	Val	Arg	Leu
				85					90						95
Val	Lys	Ile	Gly	Ser	Gly	Leu	Asn	Glu	Thr	Val	Ser	Ile	Gly	Asn	Phe
			100					105					110		
Gly	Gly	Thr	Val	Lys	Ser	Glu	Ala	His	Leu	Pro	Gly	Leu	Ile	Ala	Leu
		115					120					125			
Phe	Ile	Lys	Ala	Val	Ile	Ser	Cys	Ala	Glu	Gly	Ala	Phe	Ala	Cys	Thr
	130					135					140				
Cys	Thr	Gly	Val	Ile	Cys	Ser	Val	Pro	Ala	Asn	Tyr	Asp	Ser	Val	Gln
	145				150					155					160
Arg	Asn	Phe	Thr	Asp	Gln	Cys	Val	Ser	Leu	Ser	Gly	Tyr	Gln	Cys	Val
				165					170						175
Tyr	Met	Ile	Asn	Glu	Pro	Ser	Ala	Ala	Ala	Leu	Ser	Ala	Cys	Asn	Ser
		180						185					190		
Ile	Gly	Lys	Lys	Ser	Ala	Asn	Leu	Ala	Val	Tyr	Asp	Phe	Gly	Gly	Gly
		195				200						205			
Thr	Phe	Asp	Val	Ser	Ile	Ile	Ser	Tyr	Arg	Asn	Asn	Thr	Phe	Val	Val
	210					215					220				
Arg	Ala	Ser	Gly	Gly	Asp	Leu	Asn	Leu	Gly	Gly	Arg	Asp	Val	Asp	Arg
	225				230					235					240
Ala	Phe	Leu	Thr	His	Leu	Phe	Ser	Leu	Thr	Ser	Leu	Glu	Pro	Asp	Leu
				245					250					255	
Thr	Leu	Asp	Ile	Ser	Asn	Leu	Lys	Glu	Ser	Leu	Ser	Lys	Thr	Asp	Ala
			260					265					270		
Glu	Ile	Val	Tyr	Thr	Leu	Arg	Gly	Val	Asp	Gly	Arg	Lys	Glu	Asp	Val
		275					280					285			
Arg	Val	Asn	Lys	Asn	Ile	Leu	Thr	Ser	Val	Met	Leu	Pro	Tyr	Val	Asn
	290					295					300				
Arg	Thr	Leu	Lys	Ile	Leu	Glu	Ser	Thr	Leu	Lys	Ser	Tyr	Ala	Lys	Ser
	305				310					315					320
Met	Asn	Glu	Ser	Ala	Arg	Val	Lys	Cys	Asp	Leu	Val	Leu	Ile	Gly	Gly
				325					330					335	
Ser	Ser	Tyr	Leu	Pro	Gly	Leu	Ala	Asp	Val	Leu	Thr	Lys	His	Gln	Ser
			340					345					350		
Val	Asp	Arg	Ile	Leu	Arg	Val	Ser	Asp	Pro	Arg	Ala	Ala	Val	Ala	Val
		355					360					365			
Gly	Cys	Ala	Leu	Tyr	Ser	Ser	Cys	Leu	Ser	Gly	Ser	Gly	Gly	Leu	Leu
	370					375					380				
Leu	Ile	Asp	Cys	Ala	Ala	His	Thr	Val	Ala	Ile	Ala	Asp	Arg	Ser	Cys
	385					390				395					400
His	Gln	Ile	Ile	Cys	Ala	Pro	Ala	Gly	Ala	Pro	Ile	Pro	Phe	Ser	Gly
				405					410					415	
Ser	Met	Pro	Leu	Tyr	Leu	Ala	Arg	Val	Asn	Lys	Asn	Ser	Gln	Arg	Glu
			420					425					430		
Val	Ala	Val	Phe	Glu	Gly	Glu	Tyr	Val	Lys	Cys	Pro	Lys	Asn	Arg	Lys
		435					440					445			
Ile	Cys	Gly	Ala	Asn	Ile	Arg	Phe	Phe	Asp	Ile	Gly	Val	Thr	Gly	Asp
	450					455					460				
Ser	Tyr	Ala	Pro	Val	Thr	Phe	Tyr	Met	Asp	Phe	Ser	Ile	Ser	Ser	Val
	465				470					475					480
Gly	Ala	Val	Ser	Phe	Val	Val	Arg	Gly	Pro	Glu	Gly	Lys	Gln	Val	Ser
				485					490					495	
Leu	Thr	Gly	Thr	Pro	Ala	Tyr	Asn	Phe	Ser	Ser	Val	Ala	Leu	Gly	Ser

Asn His Lys Ser Asn Ile Gln Ser Ser Arg Gln Glu Arg Arg Ile Lys
 500 505 510
 Asp Pro Leu Val Val Leu Lys Asp Thr Leu Tyr Glu Phe Gln His Lys
 515 520 525
 Arg Ala Gly Trp Gly Ser Arg Ser Thr Arg Asp Leu Gly Ser Arg Ala
 530 535 540
 Asp His Ala Lys Gly Ser Gly
 545 550

<210> 12
 <211> 672
 <212> DNA
 <213> Grapevine Leafroll Virus (type 2)

<400> 12
 atgagttcca acacaagcgt gccggttggg ggtctcgaag cactcgagac ctcgggagtc 60
 gtgctgacca cgcgaaagga agcggttgat aagtttttta atgaactaaa aaacgaaaaat 120
 tactcatcag ttgacagcag ccgattaagc gattcgggaag taaaagaagt gttagagaaa 180
 agtaaagaaa gtttcaaaaag cgaactggcc tccactgacg agcacttcgt ctaccacatt 240
 atatTTTTTct taatccgatg tgctaagata tgcacaagtg aaaaggtgaa gtacgttggt 300
 agtcatacgt acgtggtcga cggaaaaacg tacaccgttc ttgacgcttg ggtattcaac 360
 atgatgaaaa gtctcacgaa gaagtacaaa cgagtgaatg gtctgctgac gttctgtgtgc 420
 gcgtgcgaag atctatatct aaccgtcgca ccaataatgt cagaacgctt taagactaaa 480
 gccgtaggga tgaaagggtt gcctgttgga aaggaatact taggcgccga ctttctttcg 540
 ggaactagca aactgatgag cgatcacgac agggcggtct ccatcggtgc agcgaaaaac 600
 gctgtcgatc gtagcgcttt cacgggtggg gagagaaaga tagttagttt gtatgatcta 660
 gggaggtact aa 672

<210> 13
 <211> 223
 <212> PRT
 <213> Grapevine Leafroll Virus (type 2)

<400> 13
 Met Ser Ser Asn Thr Ser Val Pro Val Gly Gly Leu Glu Ala Leu Glu
 1 5 10 15
 Thr Ser Gly Val Val Leu Thr Thr Arg Lys Glu Ala Val Asp Lys Phe
 20 25 30
 Phe Asn Glu Leu Lys Asn Glu Asn Tyr Ser Ser Val Asp Ser Ser Arg
 35 40 45
 Leu Ser Asp Ser Glu Val Lys Glu Val Leu Glu Lys Ser Lys Glu Ser
 50 55 60
 Phe Lys Ser Glu Leu Ala Ser Thr Asp Glu His Phe Val Tyr His Ile
 65 70 75 80
 Ile Phe Phe Leu Ile Arg Cys Ala Lys Ile Ser Thr Ser Glu Lys Val
 85 90 95
 Lys Tyr Val Gly Ser His Thr Tyr Val Val Asp Gly Lys Thr Tyr Thr
 100 105 110
 Val Leu Asp Ala Trp Val Phe Asn Met Met Lys Ser Leu Thr Lys Lys
 115 120 125
 Tyr Lys Arg Val Asn Gly Leu Arg Ala Phe Cys Cys Ala Cys Glu Asp
 130 135 140
 Leu Tyr Leu Thr Val Ala Pro Ile Met Ser Glu Arg Phe Lys Thr Lys
 145 150 155 160
 Ala Val Gly Met Lys Gly Leu Pro Val Gly Lys Glu Tyr Leu Gly Ala
 165 170 175
 Asp Phe Leu Ser Gly Thr Ser Lys Leu Met Ser Asp His Asp Arg Ala
 180 185 190

Val Ser Ile Val Ala Ala Lys Asn Ala Val Asp Arg Ser Ala Phe Thr
 195 200 205
 Gly Gly Glu Arg Lys Ile Val Ser Leu Tyr Asp Leu Gly Arg Tyr
 210 215 220

<210> 14
 <211> 597
 <212> DNA
 <213> Grapevine Leafroll Virus (type 2)

<400> 14
 atggagttga tgtccgacag caaccttagc aacctggtga taaccgacgc ctctagtcta 60
 aatggtgtcg acaagaagct tttatctgct gaagttgaaa aaatggttgg gcagaaaggg 120
 gctcctaacg aggttataga agtggtgttc ggtctactcc tttacgcact cgcggcaaga 180
 accacgtctc ctaaggttca gcgcgcagat tcagacgtta tattttcaaa tagtttcgga 240
 gagaggaatg tggtagtaac agaggggtgac ctttaagaagg tactcgacgg gtgtgcgct 300
 ctactaggt tcactaataa acttagaagc ttcggtcgta ctttactga ggcttacgtt 360
 gacttttgta tcgcgtataa gcacaaatta ccccaactca acgccgcggc ggaattgggg 420
 attccagctg aagattcgta cttagctgca gattttctgg gtacttgccc gaagctctct 480
 gaattacagc aaagtaggaa gatgttcgag agtatgtacg ctctaaaaac tgaaggtgga 540
 gtggtaaata caccagttag caatctgcgt cagctaggtga gaagggaagt tatgtaa 597

<210> 15
 <211> 198
 <212> PRT
 <213> Grapevine Leafroll Virus (type 2)

<400> 15
 Met Glu Leu Met Ser Asp Ser Asn Leu Ser Asn Leu Val Ile Thr Asp
 1 5 10 15
 Ala Ser Ser Leu Asn Gly Val Asp Lys Lys Leu Leu Ser Ala Glu Val
 20 25 30
 Glu Lys Met Leu Val Gln Lys Gly Ala Pro Asn Glu Gly Ile Glu Val
 35 40 45
 Val Phe Gly Leu Leu Leu Tyr Ala Leu Ala Ala Arg Thr Thr Ser Pro
 50 55 60
 Lys Val Gln Arg Ala Asp Ser Asp Val Ile Phe Ser Asn Ser Phe Gly
 65 70 75 80
 Glu Arg Asn Val Val Val Thr Glu Gly Asp Leu Lys Lys Val Leu Asp
 85 90 95
 Gly Cys Ala Pro Leu Thr Arg Phe Thr Asn Lys Leu Arg Thr Phe Gly
 100 105 110
 Arg Thr Phe Thr Glu Ala Tyr Val Asp Phe Cys Ile Ala Tyr Lys His
 115 120 125
 Lys Leu Pro Gln Leu Asn Ala Ala Ala Glu Leu Gly Ile Pro Ala Glu
 130 135 140
 Asp Ser Tyr Leu Ala Ala Asp Phe Leu Gly Thr Cys Pro Lys Leu Ser
 145 150 155 160
 Glu Leu Gln Gln Ser Arg Lys Met Phe Ala Ser Met Tyr Ala Leu Lys
 165 170 175
 Thr Glu Gly Gly Val Val Asn Thr Pro Val Ser Asn Leu Arg Gln Leu
 180 185 190
 Gly Arg Arg Glu Val Met
 195

<210> 16
 <211> 486

<212> DNA

<213> Grapevine Leafroll Virus (type 2)

<400> 16

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atggaagatt acgaagaaaa atccgaatcg ctcatactgc tacgcacgaa tctgaacact 60
atgcttttag tggtaagtc cgatgctagt gtagagctgc ctaaactact aatttgcggt 120
tacttacgag tgtcaggacg tggggagggtg acgtgttgca accgtgagga attaacaaga 180
gattttgagg gcaatcatca tacggtgatc cgttctagaa tcatacaata tgacagcgag 240
tctgcttttg aggaattcaa caactctgat tgcgtagtga agtttttcct agagactggt 300
agtgtctttt ggtttttcct tcgaagtga accaaaggta gagcgggtgcg acatttgcgc 360
accttcttcg aagctaacaa tttcttcttt ggatcgatt gcggtaccat ggagtattgt 420
ttgaagcagg tactaactga aactgaatct ataatcgatt ctttttgcga agaaagaaat 480
cggttaa
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<210> 17

<211> 161

<212> PRT

<213> Grapevine Leafroll Virus (type 2)

<400> 17

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Met Glu Asp Tyr Glu Glu Lys Ser Glu Ser Leu Ile Leu Leu Arg Thr
1 5 10 15
Asn Leu Asn Thr Met Leu Leu Val Val Lys Ser Asp Ala Ser Val Glu
20 25 30
Leu Pro Lys Leu Leu Ile Cys Gly Tyr Leu Arg Val Ser Gly Arg Gly
35 40 45
Glu Val Thr Cys Cys Asn Arg Glu Glu Leu Thr Arg Asp Phe Glu Gly
50 55 60
Asn His His Thr Val Ile Arg Ser Arg Ile Ile Gln Tyr Asp Ser Glu
65 70 75 80
Ser Ala Phe Glu Glu Phe Asn Asn Ser Asp Cys Val Val Lys Phe Phe
85 90 95
Leu Glu Thr Gly Ser Val Phe Trp Phe Phe Leu Arg Ser Glu Thr Lys
100 105 110
Gly Arg Ala Val Arg His Leu Arg Thr Phe Phe Glu Ala Asn Asn Phe
115 120 125
Phe Phe Gly Ser His Cys Gly Thr Met Glu Tyr Cys Leu Lys Gln Val
130 135 140
Leu Thr Glu Thr Glu Ser Ile Ile Asp Ser Phe Cys Glu Glu Arg Asn
145 150 155 160
Arg
```

<210> 18

<211> 618

<212> DNA

<213> Grapevine Leafroll Virus (type 2)

<400> 18

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atgagggtta tagtgtctcc ttatgaagct gaagacattc tgaaaagatc gactgacatg 60
ttacgaaaca tagacagtgg ggtcttgagc actaaagaat gtatcaaggc attctcgacg 120
ataacgcgag acctacattg tgcgaaggct tcctaccagt ggggtgttga cactgggtta 180
tatcagcgta attgcgtga aaaacgttta attgacacgg tggagtcaaa catacggttg 240
gctcaacctc tcgtgcgtga aaaagtggcg gttcattttt gtaaggatga accaaaagag 300
ctagtagcat tcatcacgcg aaagtacgtg gaactcacgg gcgtgggagt gagagaagcg 360
gtgaagaggg aaatgcgctc tcttaccaaa acagttttta ataaaatgtc tttggaaatg 420
gcgttttaca tgtcaccacg agcgtggaaa aacgctgaat ggttagaact aaaattttca 480
cctgtgaaaa tctttagaga tctgctatta gacgtggaaa cgctcaacga attgtgcgcc 540
```

gaagatgatg ttcacgtcga caaagtaaata gagaatgggg acgaaaatca cgacctcgaa 600
ctccaagacg aatgttaa 618

<210> 19
<211> 205
<212> PRT
<213> Grapevine Leafroll Virus (type 2)

<400> 19
Met Arg Val Ile Val Ser Pro Tyr Glu Ala Glu Asp Ile Leu Lys Arg
1 5 10 15
Ser Thr Asp Met Leu Arg Asn Ile Asp Ser Gly Val Leu Ser Thr Lys
20 25 30
Glu Cys Ile Lys Ala Phe Ser Thr Ile Thr Arg Asp Leu His Cys Ala
35 40 45
Lys Ala Ser Tyr Gln Trp Gly Val Asp Thr Gly Leu Tyr Gln Arg Asn
50 55 60
Cys Ala Glu Lys Arg Leu Ile Asp Thr Val Glu Ser Asn Ile Arg Leu
65 70 75 80
Ala Gln Pro Leu Val Arg Glu Lys Val Ala Val His Phe Cys Lys Asp
85 90 95
Glu Pro Lys Glu Leu Val Ala Phe Ile Thr Arg Lys Tyr Val Glu Leu
100 105 110
Thr Gly Val Gly Val Arg Glu Ala Val Lys Arg Glu Met Arg Ser Leu
115 120 125
Thr Lys Thr Val Leu Asn Lys Met Ser Leu Glu Met Ala Phe Tyr Met
130 135 140
Ser Pro Arg Ala Trp Lys Asn Ala Glu Trp Leu Glu Leu Lys Phe Ser
145 150 155 160
Pro Val Lys Ile Phe Arg Asp Leu Leu Leu Asp Val Glu Thr Leu Asn
165 170 175
Glu Leu Cys Ala Glu Asp Asp Val His Val Asp Lys Val Asn Glu Asn
180 185 190
Gly Asp Glu Asn His Asp Leu Glu Leu Gln Asp Glu Cys
195 200 205

<210> 20
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Artificially Synthesized Oligonucleotide Sequence

<400> 20
tgctggagct tgaggttctg c

21

<210> 21
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Artificially Synthesized Oligonucleotide Sequence

<400> 21
cggaattcac catggagttg atgtccgaca g

31

<210> 22
 <211> 33
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Artificially Synthesized Oligonucleotide Sequence

<400> 22
 agcggatcca tggcagattc gtgcgtagca gta

33

<210> 23
 <211> 216
 <212> DNA
 <213> Grapevine Leafroll Virus (type 2)

<400> 23
 acattggtta agtttaacga aaatgattag taaataataa atcgaacgtg ggtgtatcta 60
 cctgacgtat caacttaagc tgttactgag taattaaacc aacaagtgtt ggtgtaatgt 120
 gtatgttgat gtagagaaaa atccgtttgt agaacggtgt ttttctcttc tttattttta 180
 aaaaaaaaaa aaaaaaaaaa aaaaaaaagc ggccgc 216

<210> 24
 <211> 90
 <212> PRT
 <213> Beet Yellow Virus

<400> 24
 Leu Gln Tyr Arg Pro Gly Glu Gly Leu Cys Tyr Leu Ala His Ala Ala
 1 5 10 15
 Leu Cys Cys Ala Leu Gln Lys Arg Thr Phe Arg Glu Glu Asp Phe Phe
 20 25 30
 Val Gly Met Tyr Pro Thr Lys Phe Val Phe Ala Lys Arg Leu Thr Glu
 35 40 45
 Lys Leu Gly Pro Ser Ala Leu Lys His Pro Val Arg Gly Arg Gln Val
 50 55 60
 Ser Arg Ser Leu Phe His Cys Asp Val Ala Ser Ala Phe Ser Ser Pro
 65 70 75 80
 Phe Tyr Ser Leu Pro Arg Phe Ile Gly Gly
 85 90

<210> 25
 <211> 267
 <212> PRT
 <213> Beet Yellow Virus

<400> 25
 Met Gly Glu Ala Val Gln Ser Gly Leu Thr Arg Ala Tyr Pro Gln Phe
 1 5 10 15
 Asn Leu Ser Phe Thr His Ser Val Tyr Ser Asp His Pro Ala Ala Ala
 20 25 30
 Gly Ser Arg Leu Leu Glu Asn Glu Thr Leu Ala Ser Met Ala Lys Ser
 35 40 45
 Ser Phe Ser Asp Ile Gly Gly Cys Pro Leu Phe His Ile Lys Arg Gly
 50 55 60
 Ser Thr Asp Tyr His Val Cys Arg Pro Ile Tyr Asp Met Lys Asp Ala
 65 70 75 80
 Gln Arg Arg Val Ser Arg Glu Leu Gln Ala Arg Gly Leu Val Glu Asn

85 90 95
 Leu Ser Arg Glu Gln Leu Val Glu Ala Gln Ala Arg Val Ser Val Cys
 100 105 110
 Pro His Thr Leu Gly Asn Cys Asn Val Lys Ser Asp Val Leu Ile Met
 115 120 125
 Val Gln Val Tyr Asp Ala Ser Leu Asn Glu Ile Ala Ser Ala Met Val
 130 135 140
 Leu Lys Glu Ser Lys Val Ala Tyr Leu Thr Met Val Thr Pro Gly Glu
 145 150 155 160
 Leu Leu Asp Glu Arg Glu Ala Phe Ala Ile Asp Ala Leu Gly Cys Asp
 165 170 175
 Val Val Val Asp Thr Arg Arg Asp Met Val Gln Tyr Lys Phe Gly Ser
 180 185 190
 Ser Cys Tyr Cys His Lys Leu Ser Asn Ile Lys Ser Ile Met Leu Thr
 195 200 205
 Pro Ala Phe Thr Phe Ser Gly Asn Leu Phe Ser Val Glu Met Tyr Glu
 210 215 220
 Asn Arg Met Gly Val Asn Tyr Tyr Lys Ile Thr Arg Ser Ala Tyr Ser
 225 230 235 240
 Pro Glu Ile Arg Gly Val Lys Thr Leu Arg Tyr Arg Arg Ala Cys Thr
 245 250 255
 Glu Val Val Gln Val Lys Leu Pro Arg Phe Asp
 260 265

<210> 26
 <211> 316
 <212> PRT
 <213> Beet Yellows VIRUS

<400> 26
 Phe Thr Phe Thr Asn Leu Ser Ala Asn Val Leu Leu Tyr Glu Ala Pro
 1 5 10 15
 Pro Gly Gly Gly Lys Thr Thr Thr Leu Ile Lys Val Phe Cys Glu Thr
 20 25 30
 Phe Ser Lys Val Asn Ser Leu Ile Leu Thr Ala Asn Lys Ser Ser Arg
 35 40 45
 Glu Glu Ile Leu Ala Lys Val Asn Arg Ile Val Leu Asp Glu Gly Asp
 50 55 60
 Thr Pro Leu Gln Thr Arg Asp Arg Ile Leu Thr Ile Asp Ser Tyr Leu
 65 70 75 80
 Met Asn Asn Arg Gly Leu Thr Cys Lys Val Leu Tyr Leu Asp Glu Cys
 85 90 95
 Phe Met Val His Ala Gly Ala Ala Val Ala Cys Ile Glu Phe Thr Lys
 100 105 110
 Cys Asp Ser Ala Ile Leu Phe Gly Asp Ser Arg Gln Ile Arg Tyr Gly
 115 120 125
 Arg Cys Ser Glu Leu Asp Thr Ala Val Leu Ser Asp Leu Asn Arg Phe
 130 135 140
 Val Asp Asp Glu Ser Arg Val Tyr Gly Glu Val Ser Tyr Arg Cys Pro
 145 150 155 160
 Trp Asp Val Cys Ala Trp Leu Ser Thr Phe Tyr Pro Lys Thr Val Ala
 165 170 175
 Thr Thr Asn Leu Val Ser Ala Gly Gln Ser Ser Met Gln Val Arg Glu
 180 185 190
 Ile Glu Ser Val Asp Asp Val Glu Tyr Ser Ser Glu Phe Val Tyr Leu
 195 200 205
 Thr Met Leu Gln Ser Glu Lys Lys Asp Leu Leu Lys Ser Phe Gly Lys
 210 215 220

Arg	Ser	Arg	Ser	Ser	Val	Glu	Lys	Pro	Thr	Val	Leu	Thr	Val	His	Glu
225					230					235					240
Ala	Gln	Gly	Glu	Thr	Tyr	Arg	Lys	Val	Asn	Leu	Val	Arg	Thr	Lys	Phe
				245					250					255	
Gln	Glu	Asp	Asp	Pro	Phe	Arg	Ser	Glu	Asn	His	Ile	Thr	Val	Ala	Leu
			260					265					270		
Ser	Arg	His	Val	Glu	Ser	Leu	Thr	Tyr	Ser	Val	Leu	Ser	Ser	Lys	Arg
		275					280					285			
Asp	Asp	Ala	Ile	Ala	Gln	Ala	Ile	Val	Lys	Ala	Lys	Gln	Leu	Val	Asp
	290					295					300				
Ala	Tyr	Arg	Val	Tyr	Pro	Thr	Ser	Phe	Gly	Gly	Ser				
305					310					315					

<210> 27
 <211> 298
 <212> PRT
 <213> Beet Yellows Virus

<400> 27

Ile	Thr	Thr	Phe	Lys	Leu	Met	Val	Lys	Arg	Asp	Ala	Lys	Val	Lys	Leu
1				5					10					15	
Asp	Ser	Ser	Cys	Leu	Val	Lys	His	Pro	Pro	Ala	Gln	Asn	Ile	Met	Phe
			20					25					30		
His	Arg	Lys	Ala	Val	Asn	Ala	Ile	Phe	Ser	Pro	Cys	Phe	Asp	Glu	Phe
		35					40					45			
Lys	Asn	Arg	Val	Ile	Thr	Cys	Thr	Asn	Ser	Asn	Ile	Val	Phe	Phe	Thr
	50					55					60				
Glu	Met	Thr	Asn	Ser	Thr	Leu	Ala	Ser	Ile	Ala	Lys	Glu	Met	Leu	Gly
65					70					75				80	
Ser	Glu	His	Val	Tyr	Asn	Val	Gly	Glu	Ile	Asp	Phe	Ser	Lys	Phe	Asp
				85				90					95		
Lys	Ser	Gln	Asp	Ala	Phe	Ile	Lys	Ser	Phe	Glu	Arg	Thr	Leu	Tyr	Ser
			100					105					110		
Ala	Phe	Gly	Phe	Asp	Glu	Asp	Leu	Asp	Val	Trp	Met	Gln	Gly	Glu	
		115					120				125				
Tyr	Thr	Ser	Asn	Ala	Thr	Thr	Leu	Asp	Gly	Gln	Leu	Ser	Phe	Ser	Val
	130					135					140				
Asp	Asn	Gln	Arg	Lys	Ser	Gly	Ala	Ser	Asn	Thr	Trp	Ile	Gly	Asn	Ser
145					150					155				160	
Ile	Glu	Thr	Leu	Gly	Ile	Leu	Ser	Met	Phe	Tyr	Tyr	Thr	Asn	Arg	Phe
				165					170					175	
Lys	Ala	Leu	Phe	Val	Ser	Gly	Asp	Asp	Ser	Leu	Ile	Phe	Ser	Glu	Ser
			180					185					190		
Pro	Ile	Arg	Asn	Ser	Ala	Asp	Ala	Met	Cys	Thr	Glu	Leu	Gly	Phe	Glu
		195					200					205			
Thr	Lys	Phe	Leu	Thr	Pro	Ser	Val	Pro	Tyr	Phe	Cys	Ser	Lys	Phe	Phe
	210					215					220				
Val	Met	Thr	Gly	His	Asp	Val	Phe	Phe	Val	Pro	Asp	Pro	Tyr	Lys	Leu
225					230					235				240	
Leu	Val	Lys	Leu	Gly	Ala	Ser	Lys	Asp	Glu	Val	Asp	Asp	Glu	Phe	Leu
				245					250					255	
Phe	Glu	Val	Phe	Thr	Ser	Phe	Arg	Asp	Leu	Thr	Lys	Asp	Leu	Val	Asp
			260					265					270		
Glu	Arg	Val	Ile	Glu	Leu	Leu	Thr	His	Leu	Val	His	Ser	Lys	Tyr	Gly
		275					280					285			
Tyr	Glu	Ser	Gly	Asp	Thr	Tyr	Ala	Ala	Leu						
	290					295									

<210> 28
<211> 52
<212> DNA
<213> Grapevine Leafroll Virus

<400> 28
caugauaagc agcguguuua gcguaguucg gucgagggcg auuccgcgua ga 52

<210> 29
<211> 52
<212> DNA
<213> Beet Yellow Virus

<400> 29
cacgacccgc agcgguuua gctcgauucg cucgcagggcg auuccuaaga gg 52

<210> 30
<211> 52
<212> DNA
<213> Beet Yellow Stunt Virus

<400> 30
cacgaugaac agcguguuua gcguaguua gucgagggcc auccuaaaa gg 52

<210> 31
<211> 52
<212> DNA
<213> Citrus Tristeza Virus

<400> 31
cacgaaccgg cucgcguucg gcguaguaag gucacagca auuccuccaa ga 52

<210> 32
<211> 17
<212> PRT
<213> Grapevine Leafroll Virus

<400> 32
His Asp Lys Gln Arg Val Ser Val Val Arg Ser Gln Ala Ile Pro Arg
1 5 10 15
Arg

<210> 33
<211> 17
<212> PRT
<213> Beet Yellow Virus

<400> 33
His Asp Pro Gln Arg Val Ser Ser Ile Arg Ser Gln Ala Ile Pro Lys
1 5 10 15
Arg

<210> 34
<211> 17
<212> PRT

<213> Beet Yellow Stunt Virus

<400> 34

His	Asp	Glu	Gln	Arg	Val	Ser	Val	Val	Arg	Ser	Gln	Ala	Ile	Pro	Lys
1				5					10					15	

Arg

<210> 35

<211> 17

<212> PRT

<213> Citrus Tristeza Virus

<400> 35

His	Glu	Pro	Ala	Arg	Val	Gly	Val	Val	Arg	Ser	Gln	Ala	Ile	Pro	Pro
1				5					10					15	

Arg

<210> 36

<211> 598

<212> PRT

<213> Beet Yellow Virus

<400> 36

Met	Val	Val	Phe	Gly	Leu	Asp	Phe	Gly	Thr	Thr	Phe	Ser	Ser	Val	Cys
1				5					10					15	
Ala	Tyr	Val	Gly	Glu	Glu	Leu	Tyr	Leu	Phe	Lys	Gln	Arg	Asp	Ser	Ala
			20					25					30		
Tyr	Ile	Pro	Thr	Tyr	Val	Phe	Leu	His	Ser	Asp	Thr	Gln	Glu	Val	Ala
		35				40						45			
Phe	Gly	Tyr	Asp	Ala	Glu	Val	Leu	Ser	Asn	Asp	Leu	Ser	Val	Arg	Gly
	50					55				60					
Gly	Phe	Tyr	Arg	Asp	Leu	Lys	Arg	Trp	Ile	Gly	Cys	Asp	Glu	Glu	Asn
65					70					75					80
Tyr	Arg	Asp	Tyr	Leu	Glu	Lys	Leu	Lys	Pro	His	Tyr	Lys	Thr	Glu	Leu
				85					90					95	
Leu	Lys	Val	Ala	Gln	Ser	Ser	Lys	Ser	Thr	Val	Lys	Leu	Asp	Cys	Tyr
			100					105					110		
Ser	Gly	Thr	Val	Pro	Gln	Asn	Ala	Thr	Leu	Pro	Gly	Leu	Ile	Ala	Thr
		115					120					125			
Phe	Val	Lys	Ala	Leu	Ile	Ser	Thr	Ala	Ser	Glu	Ala	Phe	Lys	Cys	Gln
	130					135					140				
Cys	Thr	Gly	Val	Ile	Cys	Ser	Val	Pro	Ala	Asn	Tyr	Asn	Cys	Leu	Gln
145					150					155					160
Arg	Ser	Phe	Thr	Glu	Ser	Cys	Val	Asn	Leu	Ser	Gly	Tyr	Pro	Cys	Val
				165					170					175	
Tyr	Met	Val	Asn	Glu	Pro	Ser	Ala	Ala	Leu	Ser	Ala	Cys	Ser	Ser	Arg
			180					185					190		
Ile	Lys	Gly	Ala	Thr	Ser	Pro	Val	Leu	Val	Tyr	Asp	Phe	Gly	Gly	Gly
		195					200					205			
Thr	Phe	Asp	Val	Ser	Val	Ile	Ser	Ala	Leu	Asn	Asn	Thr	Phe	Val	Val
	210					215					220				
Arg	Ala	Ser	Gly	Gly	Asp	Met	Asn	Leu	Gly	Gly	Arg	Asp	Ile	Asp	Lys
225					230					235					240
Ala	Phe	Val	Glu	His	Leu	Tyr	Asn	Lys	Ala	Gln	Leu	Pro	Val	Asn	Tyr
				245					250						255

Lys Ile Asp Ile Ser Phe Leu Lys Glu Ser Leu Ser Lys Lys Val Ser
 260 265 270
 Phe Leu Asn Phe Pro Val Val Ser Glu Gln Gly Val Arg Val Asp Val
 275 280 285
 Leu Val Asn Val Ser Glu Leu Ala Glu Val Ala Ala Pro Phe Val Glu
 290 295 300
 Arg Thr Ile Lys Ile Val Lys Glu Val Tyr Glu Lys Tyr Cys Ser Ser
 305 310 315 320
 Met Arg Leu Glu Pro Asn Val Lys Ala Lys Leu Leu Met Val Gly Gly
 325 330 335
 Ser Ser Tyr Leu Pro Gly Leu Leu Ser Arg Leu Ser Ser Ile Pro Phe
 340 345 350
 Val Asp Glu Cys Leu Val Leu Pro Asp Ala Arg Ala Ala Val Ala Gly
 355 360 365
 Gly Cys Ala Leu Tyr Ser Ala Cys Leu Arg Asn Asp Ser Pro Met Leu
 370 375 380
 Leu Val Asp Cys Ala Ala His Asn Leu Ser Ile Ser Ser Lys Tyr Cys
 385 390 395 400
 Glu Ser Ile Val Cys Val Pro Ala Gly Ser Pro Ile Pro Phe Thr Gly
 405 410 415
 Val Arg Thr Val Asn Met Thr Gly Ser Asn Ala Ser Ala Val Tyr Ser
 420 425 430
 Ala Ala Leu Phe Glu Gly Asp Phe Val Lys Cys Arg Leu Asn Lys Arg
 435 440 445
 Ile Phe Phe Gly Asp Val Val Leu Gly Asn Val Gly Val Thr Gly Ser
 450 455 460
 Ala Thr Arg Thr Val Pro Leu Thr Leu Glu Ile Asn Val Ser Ser Val
 465 470 475 480
 Gly Thr Ile Ser Phe Ser Leu Val Gly Pro Thr Gly Val Lys Lys Leu
 485 490 495
 Ile Gly Gly Asn Ala Ala Tyr Asp Phe Ser Ser Tyr Gln Leu Gly Glu
 500 505 510
 Arg Val Val Ala Asp Leu His Lys His Asn Ser Asp Lys Val Lys Leu
 515 520 525
 Ile His Ala Leu Thr Tyr Gln Pro Phe Gln Arg Lys Lys Leu Thr Asp
 530 535 540
 Gly Asp Lys Ala Leu Phe Leu Lys Arg Leu Thr Ala Asp Tyr Arg Arg
 545 550 555 560
 Glu Ala Arg Lys Phe Ser Ser Tyr Asp Asp Ala Val Leu Asn Ser Ser
 565 570 575
 Glu Leu Leu Leu Gly Arg Ile Ile Pro Lys Ile Leu Arg Gly Ser Arg
 580 585 590
 Val Glu Lys Leu Asp Val
 595

<210> 37
 <211> 204
 <212> PRT
 <213> Beet Yellows Virus

<400> 37
 Met Gly Ser Ala Glu Pro Ile Ser Ala Ile Ala Thr Phe Glu Asn Val
 1 5 10 15
 Ser Leu Ala Asp Gln Thr Cys Leu His Gly Glu Asp Cys Asp Lys Leu
 20 25 30
 Arg Lys Asn Phe Glu Glu Cys Leu Lys Leu Lys Gly Val Pro Glu Asp
 35 40 45
 Asn Leu Gly Ile Ala Leu Gly Leu Cys Leu Tyr Ser Cys Ala Thr Ile

50						55						60					
Gly	Thr	Ser	Asn	Lys	Val	Asn	Val	Gln	Pro	Thr	Ser	Thr	Phe	Ile	Lys		
65					70					75					80		
Ala	Ser	Phe	Gly	Gly	Gly	Lys	Glu	Leu	Tyr	Leu	Thr	His	Gly	Glu	Ile		
			85						90					95			
Asn	Ser	Phe	Leu	Gly	Ser	Gln	Lys	Leu	Leu	Glu	Gly	Lys	Pro	Asn	Lys		
		100						105					110				
Leu	Arg	Cys	Phe	Cys	Arg	Thr	Phe	Gln	Lys	Asp	Tyr	Ile	Ser	Leu	Arg		
		115						120					125				
Lys	Glu	Tyr	Arg	Gly	Lys	Leu	Pro	Pro	Ile	Ala	Arg	Ala	Asn	Arg	His		
	130					135						140					
Gly	Leu	Pro	Ala	Glu	Asp	His	Tyr	Leu	Ala	Ala	Asp	Phe	Ile	Ser	Thr		
145					150					155					160		
Ser	Thr	Glu	Leu	Thr	Asp	Leu	Gln	Gln	Ser	Arg	Leu	Leu	Leu	Ala	Arg		
				165					170						175		
Glu	Asn	Ala	Thr	His	Thr	Glu	Phe	Ser	Ser	Glu	Ser	Pro	Val	Thr	Ser		
			180					185					190				
Leu	Lys	Gln	Leu	Gly	Arg	Gly	Leu	Gly	Thr	Gly	Arg						
		195					200										

<210> 38
 <211> 216
 <212> PRT
 <213> Beet Yellow Virus

<400> 38																	
Met	Leu	Ala	Pro	Glu	Ala	Arg	Gly	Asp	Leu	Ile	His	Phe	Thr	Glu	Asn		
1				5					10					15			
Thr	Arg	Asp	Ala	Met	Glu	Thr	Phe	Phe	Asn	Ser	Tyr	Asp	Leu	Ala	Glu		
			20					25					30				
Tyr	Ser	Glu	Val	Asn	Pro	Asn	Lys	Leu	Asn	Arg	Lys	Glu	Thr	Asp	Glu		
		35					40					45					
Leu	Leu	Gly	Val	Ile	Arg	Glu	Arg	Phe	Lys	Ser	Glu	Leu	Val	Ile	Thr		
	50					55					60						
Asp	Glu	Asp	Phe	Val	Lys	His	Leu	Ala	Phe	Ala	Leu	Ile	Arg	Ala	Ala		
65					70					75					80		
Asn	Ile	Thr	Thr	Ser	Val	Lys	Val	Asn	Tyr	Val	Gly	Ala	Tyr	Glu	Tyr		
				85					90					95			
Thr	Ile	Gly	Gly	Lys	Lys	Phe	Leu	Val	Lys	Asp	Ala	Trp	Val	Phe	Pro		
			100					105					110				
Leu	Ile	Lys	Glu	Cys	Met	Lys	Lys	Phe	Asn	Lys	Pro	Asn	Pro	Val	Arg		
		115					120					125					
Thr	Phe	Cys	Ala	Thr	Phe	Glu	Asp	Ala	Tyr	Ile	Val	Ile	Ala	Arg	Ser		
	130					135					140						
Leu	Pro	Lys	Leu	Phe	Ile	Asn	Arg	Thr	Ile	Gly	Lys	Arg	Gly	Ile	Pro		
145					150					155					160		
Ser	Gly	Tyr	Glu	Phe	Leu	Gly	Ala	Asp	Phe	Leu	Thr	Ala	Thr	Ser	Val		
				165					170					175			
Cys	Leu	Asn	Asp	His	Glu	Lys	Ala	Ile	Val	Leu	Gln	Ala	Ser	Arg	Ala		
		180						185					190				
Ala	Ile	Asp	Arg	Ala	Val	Ser	Ser	Ser	Val	Asp	Gly	Lys	Ile	Val	Ser		
		195					200					205					
Leu	Phe	Asp	Leu	Gly	Arg	Leu	Ser										
	210					215											

<210> 39
 <211> 215

<212> PRT

<213> Beet Yellow Stunt Virus

<400> 39

Met Ala Gly Gly Asn Asp Glu Gly Ser Asp Asp Ser Ser Ala Ser Gln
1 5 10 15
Thr Met Thr Ala Lys Asp Met Ile Phe Ala Pro Phe Glu Asn Phe Ala
20 25 30
Arg Ala Ser Ala Thr Cys Leu Asn Gly Glu Asn Lys Lys Lys Leu Phe
35 40 45
Glu Glu Phe Ser Val Arg Val Lys Thr Gln Asp Val Thr Glu Ser Gly
50 55 60
Ile Pro Thr Thr Leu Gly Met Thr Leu Tyr Ala Leu Ala Thr Leu Ser
65 70 75 80
Thr Ser Ser Lys Ile Asp Ile Glu Asp Lys Thr Pro Leu Val Ser Ala
85 90 95
Lys Ile Asp Ala Val Asn Val Thr Ile Thr Tyr Glu Asp Ile Lys Asn
100 105 110
Phe Val Asn Ser Leu Thr Leu Leu Lys Asn Tyr Lys Asn Lys Leu Arg
115 120 125
Val Phe Ala Arg Thr Phe Glu Glu Glu Tyr Leu Arg Phe Val Arg Gln
130 135 140
Tyr Lys His Ile Leu Pro Asn Ile Ala Arg Ala Asn Lys His Gly Ile
145 150 155 160
Pro Ala Asp Tyr Ser Tyr Leu Ala Ala Asp Phe Val Gln Thr Ser Asn
165 170 175
Leu Leu Lys Glu His Glu Gln Ala Val Leu Leu Glu Gly Arg Asn Ala
180 185 190
Ala Thr Ala Ser Ser Gly Thr Thr Arg Glu Ser Ala Val Asn Leu Lys
195 200 205
Tyr Leu Gly Gly Ser Ser Lys
210 215

<210> 40

<211> 226

<212> PRT

<213> Beet Yellow Stunt Virus

<400> 40

Met Pro Pro Gln Pro Gly Ala Glu Leu Val Glu His Asn Ala Asn Lys
1 5 10 15
Ser Ser Leu Glu Val Phe Ser Ser Glu Thr Arg Glu Lys Val Gly Lys
20 25 30
Phe Phe Asn Asn Phe Asp His Lys Thr Phe Lys Gln Val Asn Pro Asn
35 40 45
Leu Leu Asn Glu Asp Glu Leu Arg Glu Val Leu Gly Lys Leu Thr Glu
50 55 60
Leu Lys Thr Asn Leu Lys Ala Leu Asp Glu Asp Ile Tyr His His Val
65 70 75 80
Ala Phe Phe Leu Leu Arg Ala Ser Val Val Ser Thr Ser Pro Lys Val
85 90 95
Glu Tyr Lys Gly Ser Tyr Ser Tyr Ser Ile Asp Gln Arg Lys Tyr Thr
100 105 110
Val Asn Asp Ala Trp Ile Phe Pro Gln Val Lys Ile Leu Ala Ser Lys
115 120 125
His Asn Lys Pro Asn Gly Leu Arg Ala Phe Cys Ala Ser Leu Glu Gly
130 135 140
Met Tyr Leu Ser Val Ala Arg Leu Gly Pro Asp Ala Phe Gly Thr Arg

145		150		155		160
Ser	Val	Gly	Lys	Arg	Gly	Ala
		165		170		175
Asp	Phe	Leu	Thr	Ser	Thr	Cys
		180		185		190
Val	Ala	Leu	Ser	Ala	Ser	Arg
		195		200		205
Gln	Ile	Asp	Lys	Lys	Met	Val
		210		215		220
Tyr	Thr					
225						

<210> 41
 <211> 223
 <212> PRT
 <213> Citrus Tristeza Virus

<400> 41						
Met	Asp	Asp	Glu	Thr	Lys	Lys
1			5			10
Glu	Gly	Asp	Asp	Val	Val	Ala
			20			25
Leu	His	Ile	Asp	Pro	Thr	Leu
		35				40
Ser	Thr	Gln	Gln	Asn	Ala	Ala
		50				55
Lys	Gly	Lys	His	Pro	Asn	Leu
65					70	75
Ala	Met	Met	Leu	Tyr	Arg	Leu
					85	90
Asp	Asp	Asp	Ala	Thr	Gly	Ile
			100			105
Asp	Leu	Ser	Asp	Lys	Leu	Trp
			115			120
Ile	Gly	Asn	Arg	Thr	Asn	Ala
		130				135
Ala	Leu	Tyr	Leu	Ala	Phe	Cys
145					150	155
Gly	Arg	Pro	Leu	Asp	Ala	Gly
					165	170
Ala	Asp	Phe	Leu	Thr	Gly	Ala
			180			185
Tyr	Ile	Gln	Ala	Lys	Glu	Gln
		195				200
Val	Val	Val	Thr	Asn	Val	Arg
		210				215
						220

<210> 42
 <211> 240
 <212> PRT
 <213> Citrus Tristeza Virus

<400> 42						
Met	Ala	Gly	Tyr	Thr	Val	Leu
1			5			10
Pro	Val	Ser	Ala	Ala	Val	Pro
			20			25
						30

Phe	Val	Ala	Asn	Arg	Ser	Val	Asp	Ala	Leu	Ile	Glu	Gly	Val	Ile	Ser
		35					40					45			
Lys	Leu	Asp	Thr	Asn	Ser	Ile	Tyr	Glu	Asp	Ser	Thr	Glu	Lys	Phe	Thr
	50					55					60				
Gly	Glu	His	Leu	Lys	Tyr	Val	Met	Val	Thr	Met	Asp	Thr	Phe	Leu	Leu
65					70					75					80
Glu	Asn	Tyr	Lys	Thr	Lys	Thr	Glu	Asp	Leu	Leu	Val	His	Leu	Thr	Met
			85					90						95	
Ile	Gln	Lys	Arg	Leu	Tyr	Thr	Ile	Ser	Thr	Ser	Thr	Lys	Thr	Lys	Phe
			100					105					110		
Arg	Asp	Lys	Gly	Cys	Ile	Ser	Tyr	Val	Gln	Gly	Gly	Leu	Arg	Tyr	Lys
		115					120					125			
Leu	Leu	Asp	Lys	Val	Val	Phe	Pro	Phe	Ile	Leu	Ser	Lys	Phe	Thr	Asp
	130					135					140				
Arg	Glu	Thr	Pro	Asn	Ala	Leu	Arg	Lys	Phe	Ala	Cys	Thr	Phe	Glu	Glu
145					150					155					160
Leu	His	Leu	Cys	Met	Ala	Arg	Leu	Arg	Pro	Asp	Leu	Tyr	Glu	Asn	Lys
			165						170					175	
Arg	Thr	Thr	Arg	Ala	Gly	Thr	Pro	His	Leu	Lys	Gly	Tyr	Leu	Ser	Ala
			180					185					190		
Asp	Phe	Leu	Ser	Gly	Ser	Leu	Pro	Gly	Tyr	Ser	Glu	His	Glu	Arg	Gly
		195					200					205			
Ile	Ile	Leu	Arg	Ala	Ser	Glu	Ser	Met	Leu	Ala	Arg	Arg	Gln	Gly	Tyr
	210					215					220				
Glu	Glu	Ala	Thr	Glu	Leu	Leu	Asn	Leu	Arg	Asp	Leu	Gly	Lys	Tyr	Leu
225					230					235					240

<210> 43
 <211> 553
 <212> PRT
 <213> Beet Yellow Virus

<400> 43

Met	Thr	Thr	Arg	Phe	Ser	Thr	Pro	Ala	Asn	Tyr	Tyr	Trp	Gly	Glu	Leu
1				5					10					15	
Phe	Arg	Arg	Phe	Phe	Gly	Gly	Gln	Glu	Trp	Lys	Asn	Leu	Met	Ser	Glu
			20					25					30		
Ala	Ala	Ser	Val	Ser	Arg	Pro	Arg	Tyr	Ser	Ser	Asp	Phe	Arg	Phe	Ser
		35				40					45				
Asp	Gly	Val	Ile	Leu	Ser	Arg	Lys	Thr	Phe	Gly	Glu	Ser	Thr	Gly	Glu
	50					55					60				
Ser	Phe	Val	Arg	Glu	Phe	Ser	Leu	Leu	Leu	Thr	Phe	Pro	Lys	Thr	Tyr
65					70					75					80
Glu	Val	Cys	Lys	Leu	Cys	Gly	Val	Ala	Met	Glu	Leu	Ala	Leu	Asn	Gly
			85					90						95	
Met	Asn	Arg	Leu	Ser	Asp	Tyr	Asn	Val	Ser	Glu	Phe	Asn	Ile	Val	Asp
			100					105					110		
Val	Lys	Thr	Val	Gly	Cys	Lys	Phe	Asn	Ile	Gln	Ser	Val	Thr	Glu	Phe
		115					120					125			
Val	Lys	Lys	Ile	Asn	Gly	Asn	Val	Ala	Glu	Pro	Ser	Leu	Val	Glu	His
	130					135					140				
Cys	Trp	Ser	Leu	Ser	Asn	Ser	Cys	Gly	Glu	Leu	Ile	Asn	Pro	Lys	Asp
145					150				155						160
Thr	Lys	Arg	Phe	Val	Ser	Leu	Ile	Phe	Lys	Gly	Lys	Asp	Leu	Ala	Glu
			165					170						175	
Ser	Thr	Asp	Glu	Ala	Ile	Val	Ser	Ser	Ser	Tyr	Leu	Asp	Tyr	Leu	Ser
			180					185					190		
His	Cys	Leu	Asn	Leu	Tyr	Glu	Thr	Cys	Asn	Leu	Ser	Ser	Asn	Ser	Gly

Gly	Ser	Ser	Leu	Thr	Ser	Ala	Glu	Leu	Arg	Pro	Ala	Arg	Ser	Gly	Thr	50	55	60
Ala	Glu	Tyr	Glu	Ile	Ala	Leu	Leu	Ile	Phe	Ser	Asp	Ser	Ile	Thr	Lys	65	70	75
Trp	Ser	Glu	Lys	Leu	Glu	Arg	Ser	Ile	Tyr	Arg	Gly	Leu	Asn	Gln	Ile	85	90	95
Asn	Asn	His	Ser	Ile	Tyr	Ala	Glu	Thr	Glu	Leu	Glu	Val	Thr	Asp	Val	100	105	110
Lys	Thr	Ile	Gly	Cys	Lys	Phe	Thr	Ile	Ser	Ala	Val	Glu	Ser	Phe	Met	115	120	125
Gly	Gly	Arg	Ala	Ser	Ala	Ala	Gln	Val	Glu	His	Cys	Trp	Ser	Leu	Ser	130	135	140
Asn	Ser	Cys	Gly	Glu	Leu	Ile	Asn	Pro	Asn	Asp	Thr	Ala	Arg	Phe	Ile	145	150	155
Gln	Leu	Val	Phe	Lys	Asp	Lys	Ala	Val	Thr	Glu	Gln	Ala	Gln	Val	Asn	165	170	175
Thr	Ser	Gly	Ser	Val	Ser	Asp	Tyr	Leu	Val	Tyr	Cys	Leu	Gln	Leu	Tyr	180	185	190
Asp	Asn	Ser	Lys	Lys	Lys	Ser	Asn	Ala	Gly	Arg	Thr	Gln	Leu	Met	Glu	195	200	205
Ser	Tyr	Val	Ser	Phe	Ile	Arg	Asp	Phe	Phe	Gln	His	Ser	Asp	Leu	Tyr	210	215	220
Tyr	Arg	Ser	Pro	Leu	Asp	Asn	Pro	Leu	Leu	Thr	Gly	Val	Leu	Tyr	Asp	225	230	235
Leu	Cys	Ile	Glu	His	Asn	Val	Leu	Arg	Gly	Ser	Tyr	Leu	Lys	Asn	Leu	245	250	255
Asp	Asn	Phe	Arg	Leu	Phe	Lys	Gln	Thr	Tyr	Leu	Pro	Met	Ile	Asp	Asp	260	265	270
Ile	Phe	Asp	Tyr	Ser	Trp	Glu	Leu	Tyr	Ala	Pro	Asp	Glu	Arg	Leu	Leu	275	280	285
Phe	Pro	Ile	Asp	Pro	Tyr	Glu	Ile	Ile	Lys	Glu	Val	Pro	Thr	Met	Ser	290	295	300
Val	Ile	Asp	Ala	Asn	Val	Val	Leu	Ser	Asn	Lys	Leu	Val	Tyr	Leu	Asp	305	310	315
Ser	Tyr	Leu	Glu	Asn	Asn	Ser	Ile	Leu	Ala	Leu	Glu	Lys	Lys	Ile	Ile	325	330	335
Ser	Ile	Leu	Cys	Arg	Asp	Asn	Glu	Gly	Ile	Asp	Glu	Gly	Ala	Leu	Trp	340	345	350
Ala	Ala	Phe	Phe	Cys	Tyr	Tyr	Gly	Thr	Tyr	Arg	Thr	Ala	Arg	Gln	Arg	355	360	365
Val	Val	Lys	Arg	Pro	Asp	Thr	Tyr	Glu	Leu	Asp	Gly	Ile	Phe	Ser	Lys	370	375	380
Pro	Ile	Val	Met	Ser	Gly	Val	Glu	Leu	Phe	Phe	Asp	Glu	Leu	Gln	Lys	385	390	395
Arg	Val	Pro	Asp	Val	Ser	Leu	Arg	Arg	Arg	Phe	Asn	Gly	Ala	Lys	Ala	405	410	415
Gly	Glu	Ala	Ile	Thr	Val	Phe	Lys	Lys	Leu	Gly	Ile	Ser	Phe	Pro	Pro	420	425	430
Ile	Thr	Arg	Leu	Asn	Ala	Pro	Ser	Lys	Tyr	Ser	Tyr	Leu	Asn	Ile	Asp	435	440	445
Tyr	Phe	Lys	Gln	Ala	Asn	Ser	Leu	Gly	Leu	Thr	Glu	Pro	Glu	Lys	Ile	450	455	460
Ile	Leu	Cys	Asn	Ile	Ala	Lys	Asp	Val	Asp	Met	Met	Cys	Ala	Gln	Arg	465	470	475
Ile	Ser	Ser	Val	Lys	Ala	Lys	Pro	Ile	Ala	Gln	Arg	Asn	Gly	Glu	Ala	485	490	495
Ile	Asn	Ser	Ala	Lys	Ile	Arg	Thr	Leu	Pro	Thr	Asn	Thr	Leu	Val	Arg	500	505	510
Ala	Leu	Glu	Lys	Cys	Leu	Leu	Asn	Gln	Ala	Pro	Ser	Trp	Trp	Asn	Thr			

515
Thr Leu Thr Asn Leu Arg
530

520

525

<210> 45
<211> 535
<212> PRT
<213> Citrus Tristeza Virus

<400> 45
Met Ser Ser His His Val Trp Gly Ser Leu Phe Arg Lys Phe Tyr Gly
1 5 10 15
Glu Ala Ile Trp Lys Glu Tyr Leu Ser Glu Ser Thr Arg Asn Phe Asp
20 25 30
Glu Arg Asn Val Ser Leu Asp His Thr Leu Ser Ser Gly Val Val Val
35 40 45
Arg Arg Gln Ser Leu Leu Asn Ala Pro Gln Gly Thr Phe Glu Asn Glu
50 55 60
Leu Ala Leu Leu Tyr Asn Ser Val Val Ile Asn Asp Phe Val Glu Leu
65 70 75 80
Thr Gly Met Pro Leu Lys Ser Leu Met Thr Gly Ile Glu Asp Arg Lys
85 90 95
Val Pro Asp Glu Leu Ile Ser Val Asp Pro His Glu Val Gly Cys Arg
100 105 110
Phe Thr Leu Asn Asp Val Glu Ser Tyr Leu Met Ser Arg Gly Glu Asp
115 120 125
Phe Ala Asp Leu Ala Ala Val Glu His Ser Trp Cys Leu Ser Asn Ser
130 135 140
Cys Gly Arg Leu Leu Ser Ser Thr Glu Ile Asp Ala Tyr Lys Thr Leu
145 150 155 160
Val Phe Thr Lys Asn Phe Asp Ser Asn Val Ser Gly Val Thr Thr Lys
165 170 175
Leu Glu Thr Tyr Leu Ser Tyr Cys Ile Ser Leu Tyr Lys Lys His Cys
180 185 190
Met Lys Asp Asp Asp Tyr Phe Asn Leu Ile Leu Pro Met Phe Asn Cys
195 200 205
Leu Met Lys Val Leu Ala Ser Leu Gly Leu Phe Tyr Glu Lys His Ala
210 215 220
Asp Asn Pro Leu Leu Thr Gly Met Leu Ile Glu Phe Cys Leu Glu Asn
225 230 235 240
Lys Val Tyr Tyr Ser Thr Phe Lys Val Asn Leu Asp Asn Val Arg Leu
245 250 255
Phe Lys Ser Lys Val Leu Pro Val Val Leu Thr Val Trp Asp Ile Ser
260 265 270
Glu Pro Asp Asp Pro Met Asp Glu Arg Val Leu Ile Pro Phe Asp Pro
275 280 285
Thr Asp Phe Val Leu Asp Leu Pro Lys Leu Asn Ile His Asp Thr Met
290 295 300
Val Val Val Gly Asn Gln Ile Arg Gln Leu Glu Tyr Val Val Glu Ser
305 310 315 320
Asp Ala Leu Asp Asp Leu Ser Gln His Val Asp Leu Arg Leu Ala Ala
325 330 335
Asp Asn Pro Asp Leu Arg Val Gly Leu Arg Trp Ala Gly Met Phe Val
340 345 350
Tyr Tyr Gly Val Tyr Arg Cys Val Val Asp Arg Ala Val Glu Arg Pro
355 360 365
Thr Leu Phe Arg Leu Pro Gln Lys Leu Leu Ser Gln Asp Asp Gly Glu
370 375 380

Ser Cys Ser Leu His Met Gly Ser Val Glu Ala Leu Phe Asn Leu Val
 385 390 395 400
 Gln Lys Val Asn Lys Asp Ile Asn Val Arg Arg Gln Phe Met Gly Arg
 405 410 415
 His Ser Glu Val Ala Leu Arg Leu Tyr Arg Asn Leu Gly Leu Arg Phe
 420 425 430
 Pro Pro Ile Ser Ser Val Arg Leu Pro Ala His His Gly Tyr Leu Tyr
 435 440 445
 Val Asp Phe Tyr Lys Arg Val Pro Asp Gly Ala Val Thr Ala Asp Glu
 450 455 460
 Leu Glu Ser Leu Arg Gln Leu Arg Ser Ser Val Asp Val Met Cys Lys
 465 470 475 480
 Asp Arg Val Ser Ile Thr Pro Pro Pro Phe Asn Arg Leu Arg Arg Gly
 485 490 495
 Ser Ser Arg Thr Phe Arg Gly Arg Gly Ala Arg Gly Ala Ser Ser Arg
 500 505 510
 His Met Ser Arg Asp Val Ala Thr Ser Gly Phe Asn Leu Pro Tyr His
 515 520 525
 Gly Arg Leu Tyr Ser Thr Ser
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 <213> Beet Yellows Virus

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<210> 47
 <211> 61
 <212> DNA
 <213> Beet Yellow Stunt Virus

<400> 47
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 a 61

<210> 48
 <211> 61
 <212> DNA
 <213> Citrus Tristeza Virus

<400> 48
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